

Mount Diablo Astronomical Society

Diablo Moon Watch

May 2011

GENERAL MEETING

Tuesday May 24, 2011

EINSTEIN AND THE FAR FUTURE OF INTERSTELLAR TRAVEL

By Dr. Andisheh Mahdavi, SFSU

*Doors open at 6:45 p.m.
Concord Police Association Facility
5060 Avila Road, Concord*

Einstein's two theories of relativity have dramatic consequences for the far future of human spaceflight.

The most famous predictions come from his special theory of relativity: that it is difficult even to approach the speed of light, impossible to exceed it, and the closer we are to the speed of light, the less we age. But the story goes deeper: Einstein's general theory of relativity allows for "warp drive" spacetimes that resemble the stuff of science fiction.



Unfortunately, Einsteinian warp drives require an exotic form of matter which most physicists believe cannot exist, and this keeps them firmly in the realm of science fiction for now.

However, using Einstein's equations, we are able to calculate the structure of such warp drives and get a physically correct idea of what they might look like if exotic matter states were to exist. The construction of such devices would require the capability to engineer several Suns' worth of material.

Most of the material in the universe is invisible. That is one of the most dramatic, perplexing, and yet persistent findings of modern astrophysics. We know that dark matter exists because of the way it tugs on galaxies, heats cosmic gas, and bends the light from distant objects. My research involves mapping the large dark halos within cluster of galaxies, looking for structures that reveal the nature and composition of dark matter.

Dr. Andisheh Mahdavi is an Assistant Professor of Physics and Astronomy at San Francisco State University with a Ph.D. in Astronomy and Astrophysics from Harvard University.

WHAT'S UP

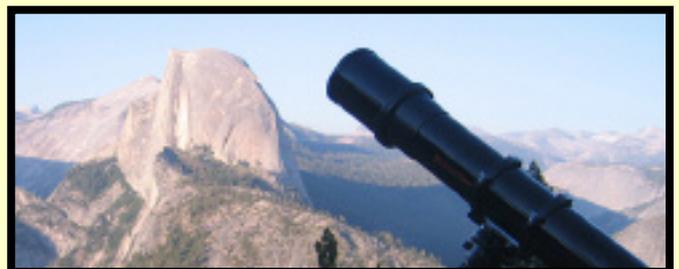
Title: *An Astronomy Trip to Chile*

by Alan Agrawal

This past December I was lucky enough to travel to Chile to view the Southern Skies in the Atacama desert, in an austere and beautiful location near the Andes mountains. I will give a brief introduction to the layout of the country and the observatories down there, followed by details of the site and set up for viewing, and then of course discuss some of the viewing highlights.

Yosemite Star Party June 24 and 25, 2011

See details on page 8



PRESIDENT'S CORNER

Adventures In Aperture Fever (Part 1)

by Chris Ford

Periodically I will use my President's Corner to discuss a subject near and dear to most of us - telescopes!

This month I am going to describe the decision process that led me to recently place an order for a large 24" newtonian telescope at the very fast focal ratio of F/3.3. As over the next year my new tele-

scope is assembled, I will periodically review how it is progressing as both a case study in current trends in large telescope design, and to share the experience of ordering a premium custom built telescope should anyone else be considering the same. Lets begin by reviewing the various choices that led me to select the final optical and structural configuration.

Aperture fever

It started with that common malady from which many of us suffer. Though I have combined astrophotography with visual observing for many years, my telescopes of choice have usually been compact and portable instruments in the 5" to 10" aperture range that have served well

in both capacities, primarily larger refractors and catadioptric designs. More recently I have enjoyed observing very deep sky objects for which the light grasp of aperture is essential. Consequently, a year ago I started researching my options for a large aperture telescope with the three most basic requirements being (i) as a lifetime telescope it had to have the best optical and



An Equatorial Platforms 28" SpicaEyes Telescope.

mechanical integrity possible, (ii) for reasons of practicality and personal preference it had to be reasonably portable preferably by a vehicle no larger than an SUV, and (iii) the design had to be compatible with the evolving CCD and video-astronomy technologies that are increasingly part of the future of amateur astronomy.

Portability

Observing through various large reflectors at star parties, I found that only apertures exceeding 20" provided me with the type of deep sky visual experience I wanted. At the same time the traditional F/5 to F/4 Dobsonian's in that aperture range are just too big and cumbersome for both my portability requirements and my preferred observing style. It is not

so much the logistics of assembling a large telescope in the field that are unappealing, after all assembling the equipment needed for astrophotography is usually a greater logistical challenge. Rather, I prefer the flexibility of quickly switching between targets and viewing them for extended periods just as I can do with my



The rear of a SpicaEyes mirror box showing the flotation system, fans, and temperature gauges.

smaller telescopes, ideally standing or even seated at least for objects not at the zenith. Unfortunately, standing on the ground or being seated are not attributes typically associated with a 20" plus Dobsonian, the usual remedy for aperture fever. Putting it all together, what I really needed was a large 20" plus aperture reflector that could track the sky, be targeted quickly and easily without recourse to ladders, be adaptive to photographic requirements, and that would satisfy my portability and storage requirements.

Fortunately the recent availability to the amateur astronomer of premium large mirrors faster than F/4 has made it feasible to satisfy all of these demands. The "new Dobsonian revolution" has been fairly well documented in the astronomy media, and rather than repeat it here, I will describe it through the decision process that led me to place an order in April for my future telescope. The availability of large high quality mirrors and corrective optics that

Adventures In Aperture Fever (Part 1) *(Continued from previous page)*

completely eliminate the coma effects associated with fast optical systems has opened up a number of interesting new possibilities and illustrates how large aperture telescope design continues to evolve.

Aperture and focal ratio

That was my first decision which would in turn dictate the general height of my projected telescope and it finally came down to two choices, a 28" mirror at F/3.0 or a 24" mirror at F/3.3. After looking at other telescopes in this size and aperture range I finally decided on a 24" at F/3.3. This will result in an eyepiece at most only 80" high for such a large mirror. In most situations I will be able to stand on the ground or even sit except at the zenith where a small step will be necessary. I could have actually have gone for 28" but the small

not personally think it has much in common with Dobson's original design of a low cost accessible telescope and mounting. Due to the corrective optics and drive

focal ratio, and also by the various telescopes I have had direct experience of observing through at star parties. Given the reality that a custom built telescope is not



A range of mirror substrates Mike Lockwood works with. (Quartz, plate glass, pyrex, and cellular)

system I will refer to below, I think of it more as an alt/azimuth mounted catadioptric newtonian.

Search for custom telescope builders

I do not have the skills or time to build such a telescope

cheap, a good track record and support availability is a critical factor. My short list ultimately came down to Starmaster, Webster, and Equatorial Platforms. I discarded manufacturers like Obsession who are not currently building fast optical systems and whose business model is not adaptable to my custom requirements. Likewise I rejected non-newtonian designs and builders simply because the mounting requirements for 20" plus telescopes are too unmanageable.

My choice of builder was also closely coupled to the basic structure of the telescope. Though primarily for visual use, I also require a stiff and flex free structure not only to hold collimation easily at such a fast focal ratio but for video-astronomy and photographic usage, all which led me to prefer aluminum over wood. Just as importantly, an aluminum structure is also considerably lower profile and less bulky than the traditional wooden Dobsonian, and



Mike Lockwood with a large custom 50" mirror.

increase of an extra 4" of aperture did not seem worth the extra weight and bulk. By all measures, 24" fell into the sweet spot especially with respect to portability in an SUV sized vehicle. Though the resulting telescope conceptually resembles a Dobsonian, I do

myself so my next step was to extensively research premium custom telescope builders. My short list was dictated both by those manufacturers who are currently offering sub F/4 telescopes and who have experience of building quality instruments at this fast

Adventures In Aperture Fever (Part 1) (Continued from previous page)

personally I prefer it from an aesthetic point of view also.

All this led me to Tom Osypowski who is best known as the owner of Equatorial Platforms here in California. (Grass Valley) In addition to fine equatorial tracking platforms for traditional Dobsonian's, Tom also builds a series of premium aluminum telescopes called SpicaEyes and I was highly impressed viewing through his 30" F/3 specimen at the 2010 GSSP. Unfortunately that desirable aperture is somewhat too big for my requirements but Tom was more than willing to build me a 24" F/3.3 or even an F/3.0 to whatever configuration I desired. The fact that Tom is also relatively local and a drive away is another bonus. After pondering whether to go as low as F/3.0 I eventually decided to go for F/3.3. Consulting with those who have experience of these fast mirrors, there is not that much difference between the two ratios, except that the F/3.0 would have been a little more demanding. Having said that, there are mirrors currently being made for amateur astronomers getting down to the F/2.55 to F/2.8 range. However when you are this low there are some coma effects in the widest angle Ethos eyepieces even with a Parracor 2 coma corrector, so I decided to be a little more conservative. There are also a number of new Starmaster FX series telescopes at F/3.3 and 24" in circulation which have already established this configuration as a practical one.

Drive system

Another key attraction that led

me to select Tom Osypowski is his use of the Slip Stream drive system from Sidereal Technologies that integrates a slip clutch on both axes for full-time manual and



Some Lockwood Optics mirror making machines

motorized slew control. This satisfied one of my key requirements to be able to either manually find the target or use a GOTO system and leave the telescope to automatically track and keep objects centered in my field of view. The integrated clutches allow one to move the telescope at any time by hand or with the motorized slew control, and all with no levers to disengage. Tom includes many other innovative touches such as sealed mirror boxes for transportation and storage, a rotating upper cage for optimal viewing placement, internal wiring for heaters and cameras, and a specially optimized flotation system incorporating 4 point edge support rather than the traditional mirror sling.

Mirrors

The other major decision of course was where to source the optics. Given they are the heart of the telescope, I took considerable time to research the reputation of various mirror makers and gather

as many opinions and references as I could find. I finally chose Mike Lockwood, not only because of his stellar reputation as a mirror maker and his extensive experience of

making large fast focal ratio mirrors, but also because of my higher comfort level with makers that actively engage with the astronomy community in public forums such as Cloudy Nights or the Yahoo group devoted to his optics. Mike's level of engagement with the amateur astronomy community reminded me somewhat of Roland Christen of Astro-Physics who has always been similarly engaged and accessible whenever I have had questions about my refractors. Mike not only makes the primary mirror, but he also supplies a matching secondary and has a rigorous testing protocol. The F/3.3 24" mirror as finally ordered will be of made of supramax (pyrex analogue) substrate and will be fairly thin at 1.6" thick rather than the traditional 2". This will enable the mirror to cool down significantly faster than thicker mirrors and the mirror support system is being designed to handle a mirror of this thickness so that it maintains its figure throughout. Mike Lockwood's experience of thin monolithic mirrors was

Adventures In Aperture Fever (Part 1) *(Continued from previous page)*

another reason for me to choose him as the source of my telescopes optics. Just as importantly he could deliver in under a year.

I have made my deposits and my new telescope is now officially ordered. It will take approximately 9 months for the delivery of the optics and perhaps up to a year to receive my fully integrated telescope from Equatorial Platforms so

it should be ready for GSSP 2012. Though like everyone I am impatient, this wait is not unreasonable for what is essentially a hand crafted premium telescope, and both Tom Osypowski and Mike Lockwood will be periodically updating me as the various components progress. All the major design choices have now been made, though there are still some additional significant decisions to be

finalized that I will, touch upon in a future Presidents Corner. As the mirror and telescope structure of the 24" F/3.3. Osypowski/Lockwood comes together I will provide further updates on my experience of ordering a custom built premium telescope.

Chris Ford

The Golden State Star Party 2011

June 29 to July 3, 2011

The Astronomy Connection is once again proud to organize and sponsor the Golden State Star Party in Adin, California from June 29 to July 3, 2011. GSSP has a long successful history that began with the first Lassen Star Party in 1994, followed by many years of first-rate astronomical events in Lassen and Shingletown venues. Since 2008, GSSP has been held at the Frosty Acres Ranch—an ideal site for astronomers and their families that offers some of California's darkest skies, a spacious camping/observing field with 360-degree horizons, an abundance of natural beauty, fun activities and attractions, and a friendly, supportive local community. Every year, GSSP has continued to grow and get better, and this year we anticipate about 400 attendees. In fact, we have capped our attendance at this number in order to control our growth and ensure the best possible star party experience for all registrants. GSSP has rapidly become a world-class star party, and astronomers from California, as well as from many other states and even other countries, have discovered that this event is well worth attending year after year.

In addition to incomparable astronomical observing, GSSP will feature free shower facilities and other amenities, a vendors area, an interesting speaker program, delicious barbecues, an astro-swap meet, prizes, and a multitude of other activities and near-by sites and attractions.

The registration fee for adult attendees is \$70 for all four days and nights. Kids under 18 are free. Further details and updates for GSSP 2011, as well as complete registration information, are available on our official Website at <http://www.goldenstatestarparty.org>.

GSSP Organizing Committee

Citizen Scientists Making Incredible Discoveries

Author: Dauna Coulter | Editor: Dr. Tony Phillips | Credit: Science@NASA

“Somewhere, something incredible is waiting to be known,” wrote Carl Sagan.

And now you can be the one to find it, thanks to Zooniverse, a unique citizen science website.

Zooniverse volunteers, who call themselves “Zooites,” are working on a project called Galaxy Zoo, classifying distant galaxies imaged by NASA’s Hubble Space Telescope. 1

“Not only are people better than computers at detecting the subtleties that differentiate galaxies, they can do things computers can’t do, like spot things that just look interesting,” explains Zooniverse director Chris Lintott, an astronomer at the University of Oxford.

Zooite Hanny van Arkel, a Dutch schoolteacher, discovered this strange green object floating in her cosmic soup:

When van Arkel noticed this unusual greenish object and posted an image of it on the Galaxy Zoo forum, not even the experts knew what it was. 2 They named it “Voorwerp,” Dutch for “object.”

Another group of Zooites found green “peas” in theirs, and dubbed themselves the “Peas-Corp.”

The peas turned out to be small, round green galaxies about

a tenth the size of the Milky Way. These are now believed to be the most efficient star factories in the universe, forming huge numbers of stars in a hurry. “It was easy to find ‘peas’ by computer once we

knew they were there, but without the human factor we’d never have noticed them,” says Lintott.

Lintott started Zooniverse in 2007 to solve a very large and unique problem: “I had too many galaxies on my hands,” he explains.

Lintott was faced with classifying, by shape, one million galaxies imaged by the Sloan Digital Sky

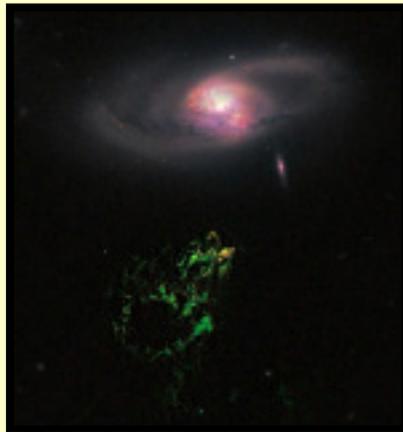
The student was good at it, but after he catalogued 50,000 images, it was obvious he needed help – a lot of help – sorting the other 950,000. The solution came to Lintott and the very relieved student while they were sitting in a pub.

“Why not ask for volunteers?”

Zooniverse and its first project, Galaxy Zoo, were born.

“We were blown away by the response. We had so many hits that our web server crashed on the first morning!”

They quickly solved the server problem and the project took off. With the Hubble Space Telescope, Galaxy Zoo is taking volunteers deeper into the cosmos than ever before. And the Zooniverse team has proven that the Zooites’ classifications are as good as those by professional astronomers.



In this image, the Voorwerp floats near a spiral galaxy. Credit: NASA/ESA Hubble Space Telescope



These “green peas” are actually galaxies. Credit: Carolin Cardamone and Sloan Digital Sky Survey

Survey. First he did what any self-respecting scientist would do.

“I asked a graduate student to classify them.”

“Their contributions are extremely important,” says Lintott. “They’re helping us learn how galaxies form and evolve. And they take their work seriously.”

Citizen Scientists Making Incredible Discoveries *(Continued from the previous page)*

But that doesn't prevent them from bringing a sense of adventure and just sheer fun to the research.

"Not long ago some Zooites asked us to take them on a pilgrimage to Zooniverse's birthplace. There was quite a celebration at the pub that night!"³

After Galaxy Zoo kicked off,

scientists began approaching Lintott at conferences asking for help. "They realized that we'd found a great way to sort a lot of data fast."

Zooniverse now offers several citizen science projects, including three more using NASA data. Moon Zoo volunteers use data from NASA's Lunar Reconnaissance Orbiter to count

craters, helping write the history of the moon. Milky Way project participants scour infrared images gathered in two NASA Spitzer Space Telescope surveys of the Milky Way's inner regions. They help astronomers catalogue intriguing features, map our galaxy, and plan future research. Zooniverse's Planet Hunters are helping NASA's Kepler telescope find stars likely to host planets.

"I'd love to confirm one of their finds and be able to send an email to someone saying, 'You've found a planet!'"

Now, please excuse this writer. She has planet hunting to do.

More Information

To learn more about Zooniverse, visit <http://www.zooniverse.org/>.



Above: Get involved in real science at the Zooniverse home page.

Docent Training May 21st

Carl Nielson, Mount Diablo Park Ranger, has just announced that a docent training will be held on Saturday, May 21 at the Rock City Service Yard.

If you would like to set up your telescope or other equipment on our public nights on Mount Diablo, the State Park requires you to go through this 3-hour training session. You only need to do it once (if you've had the training any time in the past, you do not need to take it again).

You also can earn volunteer hours toward free admission to the Park.

For more information on the training, please check the link below. If you have questions, please contact Ranger Nielson: CNIELSON@parks.ca.gov
Mount Diablo State Park
(925) 837-6129

Docent Training at Rock City Service Yard, Diablo, CA
Saturday May 21, 2011 10:00 AM - 1:00 PM

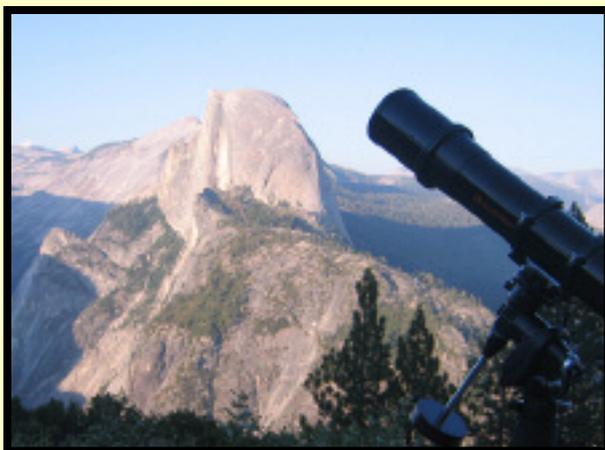
More details: http://nightsky.jpl.nasa.gov/event-view.cfm?Event_ID=27686

Ranger Nielson has promised one more docent training session this summer, but a date has not yet been set. I'll make sure to send out the notice as soon as I hear.

Thanks and see you on the mountain!

Mount Diablo Astronomical Society Event Calendar—May 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday					
1	2	3 	4	5	6:00 PM Twin Creeks Elementary St	6 3 events: Click here to view Sunset: 8:05 PM					
8	7:30 PM Board Meeting	9	8:00 PM Twin Creeks Elementary St	10 	11	12	8:30 PM Foothill Science Fair and	13	Observatory Maintenance	14 Sunset: 8:12 PM	
15	16	17 	18	6:00 PM Telecon on Kepler Mission	19	20	10:00 AM Docent Training	21 Sunset: 8:18 PM			
22	23	7:15 PM GenMtg: Warp Drives	24	Riverside Telescope Maker	25	Riverside Telescope Maker	26	Riverside Telescope Maker	27	Riverside Telescope Society Observing	28 Sunset: 8:23 PM
Riverside Telescope Maker	29	Memorial Day	30	Riverside Telescope Maker	31	1	2	3	4		



Yosemite Star Party
June 24 and 25, 2011

This is an early date, in fact it is the first star party of the year at Glacier Point. Saturn will be visible in Virgo.

As of this writing we will assemble at the volunteer group campsites (Loop C, sites 81, 89, 85, 94 and 95) in Bridalveil Campground 8 miles away from Glacier Point.

For more information please contact LeRoy Wiens at 925-689-9924 or email at ldwiens@pacbell.net.

Board Members & Address

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Chris Ford - cford81@comcast.net

Vice President

Rick Linden - Rick.C.Linden@gmail.com

Membership Coordinator, Mtg Room

Marni Berendsen - berendsen@aol.com

Meeting Program Chair

Dick Flasck - rflasck@aol.com

Outreach Coordinator, AANC Rep

Jim Head - jamesnhead@comcast.net

Publicity Board Member

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Observing Committee Chair, Board Member

Richard Ozer - rozer@pacbell.net

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Will Roberge - wil@donabue.com

Newsletter Editor

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Webmaster

Glenn Spiegelman - gspie@comcast.net

Secretary and Refreshments

Moon Trask - metallicamoon@sbcglobal.net

New Member Steward

Nick Tsakoyias - claytonjandl@aol.com

Mailing address:

MDAS

P.O. Box 4889

Walnut Creek, CA 94596-

General Meetings:

Fourth Tuesday every month,
except on the third Tuesday

Refreshments and conversations
Meetings begin at 7:15pm.

Where:

Concord Police Association

5060 Avila Road, top of the

Take Avila Road from Willow

Directions to facility:

